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Projects on
DAIRY TECHNOLOGY
Part 6

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled March 1958 by

The State Experiment Stations Division, Agricultural Research Service, U.S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued May 1958

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INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

DAIRY TECHNOLOGY

Ala.

Feed Flavors in Milk and the Design of Plant Processing Operations for Their Removal. To (1) learn conditions of temperature, time, and vacuum necessary to remove volatile flavor components from milk; (2) concentrate, separate, and characterize the volatile flavor components of milk.

Dairy Husb. 578

Ariz.

Factors Related to Oxidation Reactions in Milk, Milk Products, and Milk Constituents. To learn additional factors related to basic reactions involved in the oxidation of milk, milk products, and milk constituents.

Dairy Sci. 320

Ark.

Rancid and Bitter Flavor Defects in Arkansas Cream and Butter. To study certain causes of rancid and bitter flavors commonly found in Arkansas cream and butter, and develop methods of control.

Anim. Indus., Vet. Sci. 172

Calif.
(Davis)

The Chemistry and Nutritional Value of Milk Fat. To (1) learn compounds responsible for natural flavor of milk fat; (2) isolate and identify phospholipids and non-glyceride components; (3) learn relation of phospholipids and unsaponifiable matter to the flavor stability of milk fat; (4) investigate the role of polyunsaturated fatty acids in flavor deterioration; (5) study effect of additives on chemical stability of milk fat; (6) distribution pattern of fatty acids in glycerides of milk fat; and (7) cooperate in nutritional studies by preparing and analyzing milk fat or milk fat fractions.

Dairy Indus. 1030A

Calif.
(Davis)

Factors Influencing the Oxidation of Milk Fat and the Development of Oxidized Flavor in Milk and Milk Products. (1) Influence of rations of cow to development of oxidized flavor of milk and milk products; (2) influence of certain metals on development of oxidized flavor of milk and milk products; (3) a study of inhibitors of oxidation of milk fat; (4) significance of constituents in fat globule membrane in oxidized flavor development; and (5) investigation of compounds responsible for oxidized flavors and methods for their measurement.

Dairy Indus. 1030B

Calif. (Davis)	The Milk Lipase System, the Specificity and the Mode of Action in Hydrolysis of Milk Fat. Obtain information on (1) knowledge of mechanism of activation of lipolysis by activating treatments; (2) number of lipases in milk and their specificity; and (3) explanation for an existing wide variation in susceptibility of milk to induce lipolysis. Dairy Indus. 1030C
Calif. (Davis)	Isolation and Identification of Volatile Flavor Compounds From Dairy Products. Isolate and identify those volatile constituents causing and contributing to the desirable and undesirable flavors of dairy products. Dairy Indus. 1680
Calif. (Davis)	Identification of the Desirable Flavor Constituents of Milk and Changes Resulting From Certain Handling and Processing Procedures. To learn (1) chemical composition of compounds responsible for desirable flavor in milk with special reference to volatile flavors; (2) how vacuum treatments and other processing and handling procedures affect flavors; and (3) relation between food flavor removal and retention of desirable flavors. Dairy Indus. 1740
Colo.	The Effect of Vacuum Treatment Upon Milk. To (1) study effects of cow health, antibiotics, stage of lactation prolonged machine stripping, and feed upon subsequent development of rancidity in pipeline milkers; (2) study adverse effects upon flavor from use of vacuum storage tanks; (3) study merits of various types of pipeline; (4) devise system making use of risers in pipeline milkers without rancidity occurring; and (5) study recommended maximum subsequent holding times for raw milk passed thru pipeline arrangements. Dairy Indus. 171
Del.	The Detection and Removal of Garlic Odor and Flavor in Milk. To (1) study chemistry of garlic odor and flavor in milk; (2) develop rapid method for detection of such odors and flavors in milk; and (3) devise system whereby removal could be accomplished at farm, in tank truck, or in dairy plant. Chem. 29-C

Fla. Subnormal Milk: Its Production, Correction and Utilization. To learn causes of subnormal composition of cows' milk and investigate corrective feeding practices; and to study use of this milk in making various dairy products.
Dairy Sci. 667

Fla. Continuous Fermentation of Dairy Products. To study fundamental bacteriological principles involved in continuous fermentation of buttermilk, cottage cheese, and related fermented dairy products, and develop necessary procedure for processes.
Dairy Sci. 790

Ga. A Study of Dairy Products Processing Plants Equipment and Facilities. To (1) study present facilities of dairy processing plants in Southeast and learn methods to improve facilities; (2) develop standards of design, construction and operation of plants and equipment for dairy products processing that are economically adapted to an expanded dairy industry; and (3) study use of specialized equipment to increase dairy plant operational efficiency.
Agr. Engin. 307 Coop. AMS

Ga. The Extent of Deterioration of Certain Dairy Products as They are Affected by Distribution Methods. To (1) study influence of distribution methods upon deterioration of certain dairy products, and (2) recommend procedures for improving distribution methods that adversely affect quality of certain dairy products.
Anim. Indus. 340

Idaho Causes of Variation in the Fat and Solids-Not-Fat Content of Milk. To determine (1) influence of breeds, herds, cows, yearly environmental changes, seasons, stage of lactation, pregnancy, and age of cow on the fat and solids-not-fat content of milk; (2) heritability of percent of fat and percent of solids-not-fat on an intra-herd basis when adjustment for the important environmental effects has been made; (3) relationship between fat percent and solids-not-fat percent and to evaluate the influence of the factors given in objective (1) on this relationship; (4) value of the formalin titration test and the lactometer for determining the solids-not-fat content of milk; and (5) develop a selection index for fat and solids-not-fat production that will maximize genetic gain in both traits.
Dairy Husb. 243

Idaho

Application of Di-Electric Heating in the Processing and Marketing of Cheese. To (1) learn if microbiological activity in cheese can be stopped by dielectric heating of cheese in package, and if dielectric heating of cheese curd, in manufacturing process will reduce time required to cook out cheese and improve quality of cooked cheese curd; and (2) develop continuous or semi-continuous cheesemaking operations with use of dielectric heating.
Dairy Husb. 275

Idaho

Effect of Merchandizing Practices on Flavor and Bacteria Flora of Milk. To learn (1) temperature fluctuations and age of milk distributed in display cabinets and bulk milk dispensers; (2 and 3) type and extent of flavor deterioration of milk distributed through stores and in dispenser cans; and (4) bacteria flora that develop in milk in trade channels in (2 and 3).
Dairy Husb. 333 Coop. USDA

Ill.

The Causes and Cure of the Destabilization of Milk Proteins by Heat. To prevent the loss of dairy products due to defects attributed to heat destabilization of milk proteins by finding their fundamental causes, and more immediately, to (1) characterize electrophoretic pattern of milk proteins in normal environment, and (2) correlate patterns of various milk with their heat stability.
Food Tech. 50-343

Ill.

A Study of Chemical Changes Which Occur During the Aging of Surface Ripened Cheese. To study the rate of hydrolysis of protein, carbohydrate, and fat in surface ripened cheese, such as, limburger, munster, and brick, followed by determining the end products as they are liberated in the cheese during aging.
Food Tech. 50-347

Ill.

A Study of the Bactericidal Effects of Ultrasonic Waves in Dairy Food Products. To determine applicability of ultrasonic waves to sterilization of dairy and food products.
Food Tech. 50-383

Ind.	Manufacturing and Packaging Natural Cheese. To (1) develop standardized procedures for making cottage cheese from fresh skimmilk, reconstituted skimmilk, and a mixture of the two; (2) improve keeping quality of packaged cottage cheese; (3) make comparisons of different types coatings and films for wrapping swiss-type cheese as to their ability to prevent moisture loss and mold growth; (4) produce Gouda cheese with buttery texture and satisfactory flavor; (5) determine general relation of carbonyl compounds and cheddar cheese flavor; and (6) determine effect of additions of milk lipase to pasteurized milk on flavor of cottage cheese. Dairy Husb. 702
Ind.	Changes Caused by the Action of Bacteria and Enzymes in Raw Milk at Low Temperature. To learn (1) rate of increase of bacteria in raw milk at 40°F; (2) principle source of contamination of raw milk by psychrophilic bacteria; (3) influence of milk lipase and of lipase produced by microorganisms on flavor and fat acidity of milk; (4) influence of holding raw milk at low temperatures on rate of coagulation and firmness of coagulum produced by action of rennet; and (5) effect of holding raw milk at low temperatures on rate of protein degradation by microorganisms and enzymes. Dairy Husb. 703
Ind.	Quality Problems in the Distribution of Milk. To determine (1) bacteriological quality of milk delivered in the Lafayette area by companies in and outside of the area; (2) types of off-flavors most common in market milk and cause or causes of such off-flavors; and (3) influence of time, temperature and method of transportation on rate of development of bacteriological and flavor defects. Dairy Husb. 759
Iowa	Protein and Fat Metabolism by Microorganisms From Dairy Products. To study (1) conditions influencing production of proteolytic and lipolytic enzymes by microorganisms, (2) microbial lipases and proteases to determine conditions under which they change milk or milk products, (3) selected enzyme systems for production of desirable or undesirable changes in milk and its products, and (4) effect of one organism upon enzyme production by another. Dairy Indus. 1050

Iowa

A Study of the Oxidative Deterioration and of Adulteration of Milk Fat and of the Total Lipids of Dairy Products. Determine whether or not short-time, High-temperature keeping-quality tests indicate storage-life of milk fat or butter at 40°F, or -10°F, and attempt to determine if oxidation processes are the same in different portions of the same large lot of milk fat, when these different portions are stored at different temperatures or the same reaction proceeds at different temperatures, but at different rates.
Dairy Indus. 1128

Iowa

Problems in the Manufacture and Packaging of Ripened Cheese. To (1) make a blue cheese from pasteurized milk that will be uniform, attractive, characteristic in body texture and flavor and aroma, quick to ripen and with good sales appeal; (2) make an Iowa-type Swiss cheese with good flavor and aroma, good eye formation, minimum rind formation, block form and uniform good quality; (3) develop for Edam cheese, a product more nearly like that made in Europe; and (4) for cheddar cheese, make a cheese of high characteristic flavor from pasteurized milk.
Dairy Indus. 1188

Kans.

Development of Lactic Culture Organisms as Affected by the Prior Growth of Other Bacteria in the Milk, and/or by Pasturing Cows Versus Dry Feeding. To learn (1) if growth of bacteria present in raw milk is inhibitory to subsequent lactic culture development in pasteurized milk and types of organisms involved if such inhibition occurs, and if there is a seasonal effect; and (2) if milk from cows on pasture is more stimulatory to growth of lactic culture bacteria than is milk from dry fed cows.
Dairy Husb.; Bact. 307

Kans.

Factors Affecting the Viscosity of Milk. To learn factors that influence the viscosity of milk and other liquid dairy products.
Chem., Dairy Husb. 319

Kans. Improvement in the Technique of Drying Milk.--1. The Effect of Drying Temperatures and Periods of Drying Upon the Solubility and Flavor of Dried Milks. To determine (1) relationship between amount and types of insoluble protein material in dry milks; (2) drying temperatures and periods of drying in dried milk; and (3) if relatively low drying temperatures will improve the solubility and flavor of dry milks.
Chem., Dairy Husb. 386-1

Kans. The Effect of Increased Pasteurization Temperatures on the Keeping Quality of Milk as Reflected by Bacteriological, Chemical and Organoleptic Factors. To learn if there are advantages and/or disadvantages in new processing procedure from standpoint of keeping quality and flavor in milk.
Dairy Husb., Bact. 390

Kans. A Study of Bacterial Proteinases with Special Reference to Their Potential Use in Dairy Products. To (1) learn distribution, characterization, optimum conditions for activity, stability, substrate specificity, and end products of representative types of bacterial proteolytic enzymes; and (2) apply crude or purified enzymes to dairy products and at all feasible stages, note flavors, odors, and taste of products formed when the preparations are acting in whole milk, casein, or raw cheeses.
Bact., Dairy Husb. 508

Kans. Control of Feed Flavors in Milk. To learn (1) effectiveness of various processing treatments of milk for removal of feed flavors; (2) fundamental principles of vapor extraction and separation from liquids as applied to milk; and (4) more efficient farm management practices for minimizing occurrence of feed flavors.
Dairy Husb., Chem. 509

Ky. Problems in Processing and Marketing Creamery Butter in Kentucky. Develop a more reliable test of fresh and stored commercial butter as a measure of proper pasteurization of cream.
Anim. Indus. 405

Ky.

Relationship of Bacterial Types to Spoilage of Pasteurized Milk Held at Certain Refrigeration Temperatures. To learn relationship of coliform, mesophilic, and psychrophilic bacteria to the spoilage of pasteurized milk held at certain refrigeration temperatures.
Anim. Indus. 408

Ky.

Problems in Manufacturing Cheddar Cheese in Kentucky. To study causes of certain body and texture defects occurring in some of the cheddar cheese produced in State.
Anim. Indus. 410

Maine

Prevention of the Occurrence of Hydrolytic Rancidity of the Milk Fat in Herd's Milk. To determine whether supplementary feeding of the dairy cow with lipase inhibiting material of nutritive and unobjectionable character, leading to prevention of butterfat test reduction in held milk samples, is economically feasible.
Anim. Indus. 21

Md.

Influence of High-Temperature Heat Treatment on Certain Physical and Chemical Properties of Milk. To (1) gain more fundamental knowledge on the chemical reaction occurring in heated milk such as heat-induced flavor, changes in solubility, browning of the product, etc.; and (2) make practical application of the control of heat induced defects in established dairy products, as well as new dairy products resultant from products development research.
Dairy Husb. G-40

Md.

Flavor Quality of Concentrated Milk Products as a Factor in Milk Utilization and Marketing. To (1) attempt to identify the chemical compounds formed in flavor-deteriorated concentrated milk products; (2) learn effect of various storage conditions on flavor stability; (3) use information from (1) and (2) to recommend manufacturing and storage procedures for improving flavor.
Dairy Husb. G-48 Coop. Department of Defense

Mass.

"Come-Up" Time Milk Pasteurization. To attempt to establish the lowest temperature at which milk can be pasteurized continuously.
Bact. 17 Coop. US Public Health

Mass. Mineral Elements in Cows' Milk: Tin, Boron, Arsenic, Magnesium, Sulfur, Lead. To learn (1) normal levels of certain major mineral elements and of numerous "trace" elements in milk; in later group learn if element is naturally present in milk; (2) if amounts of these elements in milk can be increased by feeding appropriate supplements; and (3) what significance these higher levels have in human and animal nutrition, if any.

Dairy and Anim. Sci. 30

Mass. Antioxidants of Cacao Origin for Agricultural Products. To (1) evaluate antioxidant activity in butterfat of cacao shell and cocoa powder; (2) evaluate antioxidant activity in butterfat of various fractions obtained from cacao shell and cocoa powder; (3) isolate, identify, and further evaluate individual substances from cacao which appear to be potentially useful as antioxidants in dairy products; and (4) find better chemical methods as guides to detect onset on oxidative deterioration in butterfat.

Dairy and Anim. Sci. 32

Mass. The Effect of Processing Procedures on the Characteristics of the Dairy Product "Half-and-Half." To learn (1) optimum conditions for processing half-and-half, both with and without added nonfat milk solids to produce a maximum viscosity and stability; (2) if temperature of pasteurization and homogenization affect viscosity and stability of half-and-half; (3) effect of cream obtained from cold and warm milk separation on viscosity and stability of half-and-half.

Dairy and Anim. Sci. 40

Mass. Variability of Producers' Butterfat Tests. To (1) study and identify causes of variations in producers' butterfat tests, in can and bulk handling; and (2) recommend improved sampling and testing practices based on knowledge gained.

Dairy and Anim. Sci. 140 Coop. AMS

Mich. Creamery and Milk Plant Sanitation. To make bacteriological studies of dairy plant procedures and processes to learn their influence on quality, bacteria count, and safety of milk and dairy products.

Dairy 3

Mich.

A Study of the Physical and Chemical Characteristics of Milk Constituents and the Effect of Natural or Induced Changes in These Characteristics on the Properties of Milk and Processed Milk Products. To (1) determine relations existing between normal variations in fluid milk constituents, processing procedures, and quality and characteristics of processed milk products; and (2) interpret and integrate results of these basic studies into processing of milk products as a means of improving quality and consumer acceptability of dairy products.
Dairy 9

Mich.

A Study of Several Properties of Milk as Influenced by Homogenization with Special Reference to its Effect on Flavor. Produce economically a homogeneous, palatable milk with an extended shelf life by further study of exact mechanism of lipolysis resulting from homogenization of raw milk, investigating flavor stabilizing influence of homogenized milk to solar light, and role of proteins in the resurfacing of fat globules, making thorough investigation of whether milk of several days storage will respond to homogenization in same way as fresh milk.
Dairy 46

Mich.

Factors in the Study of Large Scale Manufacture of Dehydrated Cottage Cheese Culture. To obtain greater utilization of skim milk through marketing and consumption of increased quantities of cottage cheese.
Dairy 835

Mich.

The Effects of Accelerated Electron on the Physical and Chemical Characteristics of Milk Proteins. To observe effect of accelerated electron radiation on chemical and physical properties of milk protein system.
Dairy, Agr. Engin. 863

Minn.

The Chemistry of Milk as a Colloidal System. 1. The Chemistry of the Proteins of Milk. To (1) determine nature and extent of natural variations in composition of milk and factors responsible for such variations; (2) isolate and characterize protein components of milk not as yet satisfactorily identified; and (3) study physico-chemical properties and behavior of systems of milk protein components.
Biochem. 1507 Coop. ARS

Minn. Factors Influencing the Manufacture, Market Qualities, and Utilization of Mold Ripened Cheese. To (1) improve manufacturing procedures and market qualities of mold ripened cheese, and (2) develop procedures for certain mold ripened cheese practical for processors of mold ripened cheese here and in other parts of the country.
Dairy 1605

Minn. Factors Influencing the Properties and Market Qualities of Concentrated and Dry Milk Products. I, Factors Influencing the Properties and Market Qualities of Dry Whole Milk and Skim Milk. To study the fundamental factors influencing the deterioration of concentrated and dry milk products.
Dairy Husb. 1608-1

Minn. Factors Influencing Lipolysis in Milk. To (1) conduct a survey of extent of lipolysis in milk from farms using different types of milking equipment, (2) determine effect of various milking procedures and methods of handling raw milk on the initiation and degree of lipolysis, (3) develop a test to determine susceptibility of milk to lipolysis, and (4) determine mechanism of milk lipase action and factors influencing the rate, extent and nature of end products produced.
Dairy Husb., Agr., Biochem. 1618

Minn. Factors Influencing the Melting Properties and Flavor Retention of Hard Cheese When Heat Treated. To (1) develop techniques to be used in measurement of melting properties of cheese; (2) develop and apply techniques to assist in measuring the ripening or degree of ripening of a hard cheese, and to correlate with organoleptic examination as to flavor, body and texture characteristics, as well as meltdown; (3) to explore possibilities of modification of manufacturing procedure in preparation of certain hard cheese and particularly Cheddar, in an effort to improve melting qualities of ripened cheese; and (4) modify manufacturing procedures of certain hard cheese in effort to learn if it is possible to prepare a cheese that will retain more cheese flavor after going through a cooking process such as is used in commercial cookery or in the home.
Dairy Husb. 1619

Minn. Factors Influencing the Melting Properties and Flavor Retention of Hard Cheese When Heat Treated.--3. Studies Starter Cultures Used in Cheese Making. To study factors influencing production of various end products resulting from starter fermentations as related to types of microorganisms present and the milk in which starters are grown as well as external environmental conditions.
Dairy Husb. 1619 Supplement

Miss. The Effect of Heat Treatment and Storage Time on the Sulphydryl Groups of Non-Fat Dry Milk Solids and Their Measurement in Fluid Milk. To study the relation of (1) heat treatment on sulphydryl groups of non-fat dry milk and their measurement in milk; and (2) storage time on sulphydryl groups of non-fat dry milk and their measurement in milk.
Dairy Husb. HG-14

Miss. A Comparison of Certain Physical and Chemical Characteristics of Non-Fat Dry Milk Solids Manufactured in Certain Southern States With That Manufactured in Certain Northern States. To (1) compare body and texture, and flavor of cottage cheese made from various sources of non-fat dry milk solids, (2) compare curd tension at cutting time of cottage cheese made from various sources of non-fat dry milk solids, (3) develop test for syneresis, (4) compare syneresis of curd after cutting cottage cheese made from various sources of non-fat dry milk solids, (5) develop cottage cheese manufacturing procedure that will assure uniform high quality products made from non-fat dry milk solids, and (6) learn manufacturing needs necessary for non-fat dry milk solids to meet standards.
Dairy Husb. HG-15

Miss. A Study of the Factors Influencing the Market Grade of Southern Cheddar Cheese. To (1) measure any differences that may exist between southern and northern cheese, and (2) determine controlling factors which promote undesirable qualities in cheese.
Dairy Husb. HG-16

Miss. *The Effect of Various Levels of Solids Not Fat on the Flavor and Physical Characteristics of Fluid Whole Milk.* To (1) compare consumer acceptability of regular milk with milk enriched with non-fat milk solids, (2) determine most desirable level of solids not fat from milk enriched with various percents of non-fat milk solids, and (3) learn value of analytical methods to determine presence of water in milk to which non-fat milk solids have been added so as to prevent reconstitution with non-fat milk solids and water.
Dairy Husb. HG-17

Miss. *A Study of the Factors that Contribute to the Sedimentation in High Solids Plain Condensed Skim Milk and Market Acceptability of this Product.* To (1) learn composition of settled material in plain condensed skim milk; (2) learn factors that accelerate settling out of solid material; (3) develop procedures to minimize settling in plain condensed skim milk; (4) learn effect on consumer acceptance of processing methods minimizing settling.
Dairy Husb. HG-18

Mo. *Ice Cream Quality as Influenced by Emulsifiers, Sweeteners, and Dehydrated Mixes.* To learn influence of (1) new types of emulsifiers; (2) new types of sweeteners; and (3) spray processed dehydrated ice cream mixes, on flavor, body, texture, meltdown properties, et cetera of ice cream quality.
Dairy Husb. 37

Mo. *Characterization of Microorganisms Common to the Dairy Industry.* To develop bacteriological methods to determine or classify microorganisms of concern to the milk producer, or which affect quality of raw or pasteurized milk and milk products and thus provide information helpful in protecting public health.
Dairy Husb. 133

Mo. *The Quality of Milk and Related Products as Influenced by Handling and Marketing.* To learn nature, extent, and causes of deterioration in fluid milk and related products.
Dairy Husb. 284

Mont.

Milk Flavor Defects. To (1) compare flavor of fresh milk cooled over a surface cooler with that cooled in cans in a cooling tank; learn (2) if cooling milk immediately after milking eliminates the so-called "smothered" flavor; (3) time interval needed between feeding and milking cows to reduce intensity or eliminate feed flavor in fresh milk; and (4) influence of physical and sanitary condition of utensils on milk flavor.
Dairy Indus. M.S. 892

Nebr.

The Effect of Source and Proportion of Ingredients Upon Quality of Frozen Desserts. To (1) develop and/or modify formulae for ice cream, sherbet, and a low calorie frozen product with reference to solids-not-fat, sweetening agents, stabilizers and flavoring, and (2) learn flavor and texture qualities of products most acceptable to consumer.
Dairy Husb. 507

Nebr.

The Effect of Antibiotics on the Inherent Lipase Activity in Raw Milk Systems. To learn (1) if different antibiotics inhibit the milk lipase systems; and (2) factors which affect the inhibition of milk lipases by antibiotics.
Dairy Husb. 588

Nebr.

The Determination of the Occurrence and the Nature of the Starter Inhibitory and Stimulatory Substances in the Raw Milk Supply. To learn (1) prevalence and nature of antibiotics and inherent starter inhibitory substances in market milk supplies in State; (2) incidence and nature of starter stimulatory substances in milk supplies; and (3) relation between occurrence of inhibitory and stimulatory substances and the acid-producing capacity of the milk supply.
Dairy Husb. 589

N. Mex.

Influence of Water Hardness on the Detergent Action of Dairy Cleaners. To learn (1) influence of hard waters on effectiveness of chemical detergents commonly used in dairy cleaners; (2) combinations of detergent and water softening agents most effective for cleaning dairy equipment in hard water; and (3) influence of mineral waters on milkstone formation in dairy equipment.
Dairy Husb. 15

N. Y.
(Cornell)

The Physico-Chemical Properties of Milk Fat. To identify the factors governing the lipolytic and oxidative processes in milk and its products, their relationships and inter-effects.

Dairy Indus. 85

N. C.

The Control of Certain Microorganisms Used in the Preparation of Fermented Milk Products. Study factors affecting ability of milk to support growth of starter bacterial cultures.

Anim. Indus. HM-11

N. C.

Improvement of the Quality of Milk by the Prevention of Oxidized Flavor in Milk and Milk Products. To (1) study mechanisms causing development of spontaneously oxidized flavor in milk; (2) learn interrelationship between oxidizing enzymes of normal milk as compared to milk spontaneously oxidized; (3) study relationship of antioxidants, ascorbic acid content, feed, and other biological factors to development of spontaneously oxidized flavor.

Anim. Indus. HM-13

N. C.

Growth Stimulants for Certain Lactic Acid Bacteria. Study purification, isolation, and characterization of growth stimulants occurring in certain plant and animal tissue, learn role of stimulants in bacterial nutrition, study methods for use of purified stimulants in commercial fermentations involving manufacture of cultured buttermilk, cottage cheese, ripened cheeses.

Anim. Indus. H-30

N. C.

Physiochemical Changes of the Proteins in Milk Resulting from Heat Processing Treatments. To (1) study change in physiochemical properties of heat denaturable proteins in milk and milk products with reference to direct steam injection of heating; (2) correlate any findings from above studies with those reported for conventional heat exchange methods; (3) study effect various heat treatments will have on development of body, flavor, and color of various milk products.

Anim. Indus. H-128

N. Dak.

Physical and Chemical Properties of Milk Esterases (Lipases). To learn (1) if enzymes of milk which hydrolyze milk fat, producing a rancid flavor, are the ones being measured by new photometric method; (2) physical and chemical properties of milk esterases (lipases) using new method and other methods recently with blood and tissue research; and (3) influence of breed, stage of lactation, feed and management on esterase content of milk.
Dairy Indus. 11-1

N. Dak.

Evaluation of the Whiteside Test for Detection of Mastitic Milk at the Milk Receiving Station. Evaluate use of Whiteside test as means of detecting mixing of mastitic milk with normal milk. Learn relationship of bacterial counts to incidence of mastitis and/or dairy utensil sanitation.
Dairy Husb., Vet. Sci. 11-2

Ohio

Flavor of Market Milk in Relation to the Variations in Minor Organic Constituents. To (1) study variations in naturally occurring minor organic constituents of raw milk in relation to flavor; (2) learn effects of feed, age of milk, processing and psychrophilic organisms on variations in these constituents and resulting flavors; (3) relate effect of various enzyme systems of milk to variations in these constituents and effects on flavor; (4) reevaluate by newer techniques other factors contributing to production of fluid milk with superior flavor.
Dairy Tech. 170

Ohio

Chemical and Bacteriological Factors Affecting the Market Quality of Cultured Dairy Products. (1) by newer chemical techniques, identify and measure the minor chemical constituents in selected cultured products; relate constituents to quality of product; (2) establish relation between quality of milk supply, flavor of cultured dairy products, minor chemical constituents, specific metabolic processes of bacterial cultures; (3) study effects of bacterial inhibitory substances in milk supply and the processing and manufacturing conditions upon bacterial activity of cultures and upon quality of cultured product; (4) apply lab findings in establishing control measures and manufacturing procedures yielding uniformly high quality cultured products.
Dairy Tech. 186

Okla. *Production of Butter Oil From Milk.* To (1) develop a method for production of butter oil with a centrifugal separator; (2) learn quality and keeping quality of butter oil obtained with a centrifugal separator as compared with churning method.
Dairying 1008

Oreg. *Factors Affecting Activity and Flavor Production of Butter and Cheese Cultures.* To (1) study relationships between nutrient content of milk and its ability to support active growth of lactic acid starter bacteria; (2) develop practical methods of preventing bacteriophage attack in manufacture of cheese and cultured milk; (3) develop methods of eliminating or minimizing effect of antibiotics in milk on growth of lactic acid starter bacteria; and (4) investigate relationship between acid and aroma production in starter cultures and keeping quality of dairy products.
Bact. 148

Pa. *Flavor Defects in Milk and Dairy Products.* To elaborate on the chemical nature of certain off-flavors in milk and dairy products.
Dairy Sci. 822

Pa. *Microbiological Defects in Cheese.* To determine factors effecting certain microbiological changes in process cheese.
Dairy Sci., Bact. 1142-B

Pa. *Identification of Flavor Compounds in Cheese.* To identify compounds having characteristics of cheese flavor and aroma.
Dairy Sci. 1142-C

Pa. *The Effect of Mutation on Bacterial Enzymes.* To determine effect of induced genetic change on enzymes.
Bact. 1165

Pa. *Microbial Enzyme Systems Associated with Cheese Ripening.* To determine role that various microorganisms play in the normal ripening processes in cheese.
Bact. 1211

Pa.	Development of Nitrogenous Derivatives of Cheese Whey Solids. To (1) develop practical methods for recovering lactose and other whey solids from cheese through precipitation with nitrogen-containing compounds; and (2) evaluate these products for animal feed purposes. Dairy Sci. 1237
S. C.	Studies on the Composition of Milk Produced Under Southern Conditions. To study (1) relationship of butterfat and solids-not-fat in bulk herd, milk and in milk produced by related cows; and (2) milk offered for sale on principal South Carolina markets with respect to butter fat and solids-not-fat content. Dairy Husb., Agr. Chem. 92
S. C.	Methods for Evaluation of Milk Flavor. To (1) study and develop taste panels for use in controlling type and intensity of flavors in milk received and processed in dairy plants; and (2) study physical and chemical methods for analyzing and controlling milk flavors. Dairy Husb. 436
Tenn.	To Study the Enzymes in the Milk Secreting Tissue of the Mammary Gland as They are Related to Cheddar Cheese Ripening. To isolate specific enzymes or enzyme systems from mammary gland of a milk secreting cow, and study effect of adding extract of the same to pasteurized milk as related to ripening of Cheddar cheese. Dairying 94
Tenn.	Quality and Shelf Life of Dairy Products in the Marketing Channels. To (1) evaluate quality of dairy products in marketing channels; (2) learn the enzymatic degradation of the milk constituents (protein and butterfat); and (3) isolate and characterize the spoilage organisms. Dairying 165
Tex.	Bacteriological and Chemical Factors Involved in the Production of Soft Ice Cream. To (1) study manner in which psychrophiles break down milk protein and/or fat; (2) learn types and biochemical activities of psychrophiles not belonging to genus *Pseudomonas*; and (3) continue study on interactive phenomena of psychrophilic and mesophilic bacteria. Dairy Sci. 924

Vt. *A Bacteriological Study of Milk Handled in Bulk Tanks on Farms.* To (1) compare heat resistant, psychrophilic, and standard plate counts on milk samples from farm tanks and from combined deliveries in tank trucks; (2) study general morphology and cultural characteristics of organisms isolated from milk subjected to bulk handling process; (3) study certain physical and chemical changes taking place in this milk during storage; and (4) determine if there are differences in storage life of milk on daily vs. every-other-day pickup of farm supplies.
Anim. and Dairy Husb. 32

Vt. *Milk Flavors.* To (1) determine incidence of rancid flavor in milk produced in Vermont; (2) determine degree of rancidity present at different times of the year, and in several areas; (3) endeavor to determine causes of spontaneous rancidity; and (4) develop methods of preventing or eliminating this objectionable flavor.
Anim. and Dairy Husb. 33

Va. *Manufacture, Storage Life, and Utilization of Concentrated, Dried, and Frozen Milk Products.* To (1) learn chemical changes, bacterial destruction, and enzyme inactivation attributable to preheating, condensing, spray-drying, and instantizing during manufacture of dried milk products; evaluate effects of changes on quality, use, and storage life of products; (2) develop new products and improve existing manufacturing procedures, packaging methods, storage conditions, and food uses of dried and frozen products; (3) evaluate high temperature "no-hold" heat treatment of fluid milk and cream for manufacture of concentrated, dried, and frozen dairy products.
Dairy Sci. 86047

Wash. *Improved Flavor and Keeping Quality of Powdered Whole Milk.* To (1) isolate and study the nature of stale flavor component in powdered whole milk; and (2) find components in milk responsible for "powdered milk" flavor when the product is spray dried.
Dairy Sci. 721

Wash.

Factors Affecting the Ease of Reconstitution of Whole Milk Powder, With Special Reference to the Globule Adsorption Film Complex Formation. To find (1) amount of fat-protein complex under different conditions of milk powder manufacture and storage formed; (2) nature and stability of adsorption film between fat and protein; and (3) means for minimizing formation of any insoluble complex during storage of milk powder.

Dairy Sci. 783

Wash.

The Esterases of Milk. To (1) differentiate esterases of milk, and (2) study factors influencing concentration of various esterases of milk.

Dairy Sci. 1313

Wash.

Quality Studies of Raw Milk Produced Under the Farm Tank System. To learn (1) if bulk handling of milk in farm tanks together with every-other-day delivery to processing plant is detrimental to milk quality and if so learn extent to which off-quality milk occurs; (2) extent to which off-quality milk from bulk tanks is comingled with other milk; and (3) remedial measures to minimize occurrence of any quality defects encountered.

Agr. Econ. 1287, ES 401

W. Va.

The Fat Globule Membrane Protein of Milk. To (1) study methods of separation of protein and learn composition of product; and (2) learn effect that fat globule membrane protein has on milk composition, quality deterioration, curd tension, churning, whipping ability, and creaming of milk and milk products.

Dairy Husb. 110

Wis.

Physical and Chemical Properties of Milk Proteins.-- A. Physical and Chemical Properties of Milk Proteins Prepared by Various Methods of Separation and Fractionation. To gain more fundamental information about the proteins as they exist in milk and how they are altered by manufacturing processes, principally: (1) separation and fractionation of milk proteins; (2) characterization of physical and chemical properties of undenatured milk proteins; (3) study of heat denaturation of milk proteins; (4) study of protein interactions with other proteins, lipids, and carbohydrates; and (5) application of research findings to present manufactured products and to new products.

Dairy and Food Indus., Biochem. 716

Wis. The Physiology of Ultraviolet Mutants of Penicillium Roquefortii. To study physiology of normal and mutant strains of P. roquefortii relative to their role in manufacturing better roquefort cheese and of new types of mold ripened cheese.

Dairy and Food Indus. 756

Wis. Improving Dried Whole Milk to Increase Consumer Acceptance. To produce a dried whole milk acceptable by consumer. Product must reconstitute readily with water and compare to fresh whole milk.

Dairy and Food Indus., Engin. 963

Wyo. The Effect of Certain Modern Bulk Handling Practices on Flavor and Bacterial Flora of Milk. To learn (1) effects on flavor and bacterial flora of milk handled in farm bulk cooling tanks of: length of holding time, cooling rate and temperature variations, amount and type of agitation; and (2) effects of bulk transportation on flavor and bacterial flora.

Anim. Prod., Vet. Sci. and Bact. 666

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control